

# **The Albion-Sheridan Landfill PRP Group**

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4/10/97

April 10, 1997

US EPA RECORDS CENTER REGION 5



471759

Mr. Jon Peterson  
U.S. EPA - Region V  
Waste Management Division  
77 W. Jackson Blvd. - HSRW-6J  
Chicago, IL 60604

Subject: Response to EPA Comments on Preliminary Design  
Albion-Sheridan Township Landfill  
Project No. 6E13045

Dear Mr. Peterson:

On behalf of the Albion-Sheridan Township Landfill PRP Group (Group), the attached response document has been prepared to address your comments on the Preliminary Design Report for the Albion-Sheridan Township Landfill. The responses refer specifically to your letter dated March 4, 1997. Each EPA comment is shown in *italics* followed by the Group response.

The key points addressed in our response are highlighted below:

- **Site Characterization** - Many of the comments suggested that additional site characterization would be required prior to designing an appropriate groundwater monitoring program. It is the Group's position that sufficient data has already been collected during the Remedial Investigation and the Pre-Design Study to support the monitoring program agreed to by the EPA and Michigan Department of Environmental Quality (MDEQ) in the Statement of Work (SOW). Per our conference call of March 13, 1997, we agree that the two monitoring wells that remain to be installed as part of the Pre-Design Study can be relocated based on recommendations forthcoming from the MDEQ.
- **Groundwater Monitoring Parameters** - A number of comments were received that indicated the need for groundwater monitoring parameters to be added to the post-closure groundwater monitoring program. The SOW has already identified the requirements for groundwater monitoring and our program is in compliance with those requirements. The additional groundwater data collected during the Pre-Design Study did not produce any new results that would suggest the need for modifying the program.

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- **Drainage Layer Modifications** - Comments regarding the on-site soil and strip drain layer design will be incorporated into the 95% submittal. The Group will substitute a geonet synthetic material that meets the requirements of the Record of Decision for the on-site soil/strip drain design proposed in the 30% submittal.

As outlined in the monthly progress report for March 1997, the Group intends to submit the Final Design to EPA by May 9, 1997. The original submittal date of April 11, 1997 has been delayed in order to allow adequate time to prepare this response. It is our intention to also submit the Remedial Action Plan by May 9, 1997 ahead of schedule (June 9, 1997).

If you should have any questions regarding this response, please feel free to contact me at (313) 464-1800.

Sincerely,



for John Seymour, P.E.  
Project Coordinator

RGG:rgg

cc: Mr. Jack Gray - Corning, Inc.  
Mr. Chris Smith - Cooper Industries  
Ms. Kim Sakowski - MDEQ  
Ms. Elizabeth Bartz - EarthTech

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## RESPONSE TO EPA COMMENTS ON THE PRELIMINARY DESIGN REPORT

### General EPA Comment

USEPA does not concur that the landfill cover system proposed in the 30% Design is a "technical equivalent" to that in the described in the ROD and SOW. The purpose of a drainage layer is to shed water immediately off of the FML or barrier layer. In order to accomplish this, a continuous drainage layer is required over the entire surface of the FML or barrier layer.

As proposed, the strip drains are located 20 feet apart. In between the strip drains, there is the potential for as much as 1.7 feet of head to build up on the FML (as concluded by the Help Model provided in the February 14, 1997 letter to U.S. EPA). Pinhole leaks on the FML will be enlarged in areas where there is 1.7 feet of water ponding on the FML which will in turn, cause generation of leachate and compromise the integrity of the FML. Roots from the overlying vegetation will seek out the 1.7 feet of water ponding on the FML which will in turn encourage vertical cracks within the cover soil layer.

**Group Response:** Final cover designs using strip drains as a component in the drainage layer have been approved by EPA Region IX and successfully implemented on several MSW landfills in that region. However, the Group will not commit additional resources to further the technical merits of this alternative. The Group will revise the design to include a geonet drainage layer meeting the specific transmissivity requirement outlined in the ROD.

The revised cover system section from the top down will include:

- 6" Topsoil
- 18" Cover Soil
- Double-bonded Geonet meeting ROD required Transmissivity of  $3 \times 10^{-5} \text{ m}^2/\text{sec}$
- 40 mil LLDPE (Textured)
- 12" Gas Collection/Foundation Layer (sand with 12 % or passing the #200 sieve)

I assume this means the Geotextile is Banded to the net. If so - OK

All references to the drainage layer will be modified to include a description of the geonet, and the HELP and slope stability analyses will be rerun using the above cover section.

### Specific EPA Comments - Preliminary (30%) Design Report

**EPA Comment 1:** Page 1-4, paragraph eight: Please clarify that Woodward Clyde is working on behalf of the liable party group.

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 2:** Page 1-7, Section 1.3.3 Site Surveying: Please use the Global Positioning System (GPS) for well locations.

**Group Response:** This comment will be incorporated in the 95% Submittal.

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**EPA Comment 3:** *Page 1-8, Section 1.3.6 Air Emissions Study: Please include field verification of the landfill air emissions estimation model to confirm that all ARARs are met during landfill remediation and waste consolidation activities.*

**Group Response:** Fenceline air monitoring for specific volatile organic compounds (VOC) addressed in the air emissions modeling will be completed during remedial action.

**EPA Comment 4:** *Page 2-1, Restrictive Covenants/Deed Restrictions: As discussed in our February 4, 1997 meeting, it will be necessary to execute restrictive covenants that are administratively similar to the MDEQ's model documents. The 30% design document states that deed restrictions or a local ordinance will be implemented 30 days after the approval of the pre-design studies report, this was not done.*

**Group Response:** The Group will complete this task as outlined in the SOW and further clarified in our meeting of February 4, 1997. Specifically, the Group will use the materials provided by Mr. Kim Sakowski (MDEQ) as guidance.

**EPA Comment 5:** *Page 2-2: The PreDesign indicated that the use of native plant species has "substantial merit" and that the "study results will be incorporated in the Remedial Design phase." The discussion in the 30% appears to leave some doubt whether or not native species will be used.*

**Group Response:** Native species will be used to vegetate the landfill cap; the document will be clarified.

**EPA Comment 6:** *Page 2-2, Drummed Waste: The contractor hired to complete the drum removal activities should determine if excavated drums are "structurally sound."*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 7:** *Page 2-4: Change bullet at the top of the page to read that the air monitoring will be required "...during and after the remedial action...." This is consistent with page 5 of the SOW.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 8:** *Page 2-4: The section titled "Contingent Remedy" should include actions to be taken in the event landfill gas concentrations exceed applicable State criteria. The contingency should be consistent with Act 641 R.299.4433(4) and 40 CFR 258.23 which are specifically for methane; however, can be easily reworded to include other compounds or groups of compounds relevant to this site. Page 6 of the SOW specifically states that "corrective measures" will be developed in the RD for addressing exceedances of the action levels at the fence line.*

**Group Response:** The "contingent remedy" as described in the SOW refers specifically to groundwater treatment should arsenic concentrations in groundwater not meet the criteria stated in the SOW five years after completion of the remedial action. Contingent actions regarding landfill gas exceedances will be addressed as part of the contingency plan of the health and safety plan during construction and the O&M Plan during the post-closure period.

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**EPA Comment 9:** Page 3-3: The material specifications are not "arbitrary." The material specifications are derived from Michigan's Act 641. Also, in Section 3.3.1, change the reference of "with the required two percent slopes" to "to a minimum of a four (4) percent slope."

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 10:** Page 3-3: Second paragraph, Section 3.3.1 - Change the reference of "with the required two percent slopes" to "to a minimum of a four (4) percent slope."

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 11:** Page 3-3: Third paragraph, Section 3.3.1 - The site material described in the RD appears to be sufficient for the daily cover; however, it does not meet the requirements of the gas collection layer. Geotechnical testing should be performed on the all proposed material to substantiate whether or not the materials are equivalent to what is required by the ROD.

**Group Response:** The ROD requires a 12 inch sand gas collection layer on top of the existing waste mass (p. 25); no "permeability" standards are provided. Michigan Rule 425 (6) (A) and (B) require either a permeable 1 foot sand layer that vents landfill gases to gas risers or other means of assuring that gases cannot travel laterally from the site or accumulate in structures. Rule 425 also does not have a "permeability" standard. The proposed design satisfies both criteria stated in the ROD and Rule 425. Soil testing on the proposed on-site borrow source characterize the soil as a fine sand with silt and little gravel to a silty sand with little gravel. Percent fines ranged from 8.7 to 13.1 percent and a permeability of  $4 \times 10^{-3}$  cm/sec was measured for the sample with 8.7 percent fines.

**EPA Comment 12:** Page 3-4: Section 3.3.2, first paragraph - Remove quotation marks from improper ROD quotation. Also, the soil permeability and transmissivity standards stated in the ROD and SOW are appropriate for the drainage layer of the cover system even though the particular standards are cited in the leachate collection section of Act 641. The reason it is applicable is that both layers serve identical functions as far as transporting water off the FML.

**Group Response:** We do not agree with the statement that the drainage layer and leachate collection layer sections serve the same function. However, as described in the Group Response to the General EPA Comment above, the drain layer design proposed in the Preliminary Design Report will be modified to include a geonet synthetic material to meet the minimum transmissivity required in the ROD.

**EPA Comment 13:** Table 3-1: Please include Michigan Act 641 as an ARAR under the Groundwater Monitoring and Analyses section. This ARAR requires additional monitoring than what is proposed in the 30% design.

**Group Response:** Michigan Act 641 will be included in Table 3-1; however, the groundwater monitoring requirements are defined in specific terms in the SOW (p. 5); where and when wells will be sampled and required parameters.

**EPA Comment 14:** Section 3.3.2; Paragraph 1: The 3/8-inch maximum grain size specified in the ROD is appropriate for direct contact with the FML to prevent punctures. Larger materials can be used if a geotextile (8-12 oz./sq. yd.) is installed directly above the FML. For any drainage layer to be effective over the long term, a geotextile should be installed above the

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*drainage layer to prevent soils from clogging it. Installed cost for an 8 oz. geotextile runs about \$5700 per acre, non-union (quote from National Seal).*

*At the end of this paragraph, and in paragraph 2, the consultant (WCC) seems to be making some sort of appropriateness determination for the transmissivity performance standard in the ROD. Regardless of the regulatory derivation, transmissivity (T) is an appropriate alternative design criterion to hydraulic conductivity (k) for a synthetic drainage layer. Since the ROD specified a minimum T it should be considered a performance standard that must be met or exceeded. If the PRPs wanted to comment about this, the public comment period was the appropriate time.*

**Group Response:** See response to EPA Comment 12.

**EPA Comment 15:** *Page 3-4: Section 3.3.2, third paragraph - Again referring to the leachate collection section of Act 641, R.299.4423, a  $1.0 \times 10^{-2}$  cm/sec fill may be replaced with a  $1.0 \times 10^{-3}$  cm/sec fill when used in conjunction with a synthetic drainage material. Alternatively, a synthetic drainage system, such as a geonet, which is capable of providing a minimum transmissivity of  $3 \times 10^{-5}$  m<sup>2</sup>/sec over the entire area of the FML will meet the requirements of the ROD. The drainage system WCC has proposed does not provide adequate drainage over the entire cover system.*

**Group Response:** The Group does not agree that the requirements for a leachate collection layer can be directly applied to the drainage layer for a final cover system. However, the design will be modified as described in our response to EPA Comment 12.

**EPA Comment 16:** *Page 3-4: Section 3.3.2, third paragraph, last sentence - If spreading a 6-inch drain layer cannot be accomplished without reasonable protection of the FML, then it is incumbent upon WCC to modify the design to specify an appropriate depth of the drainage layer.*

*It's interesting that the 30% design proposes strip drains 1.5 inches thick, and the 2/14 letter downsizes them to 1.0 inch. This must be due to the process of materials optimizing (i.e., cost cutting). The design states that they have spaced the strip drains to allow for maintaining the intermittent saturated depth of less than 16 inches (the term refers to the peak daily head, or saturated thickness following a 25-year, 24-hour storm event). An efficient drainage layer will maintain a peak daily head within its own thickness. (Note comments below on their HELP model output. In the 2/14 letter, the peak daily head has crept up to 20 inches because WCC apparently caught the model errors in the PRPs 30% submittal.)*

*I agree that a 6 inch granular drainage layer is insufficient from a constructability perspective. Even using low ground-pressure earth moving equipment, 12 inches should be the minimum. There is no reason other than cost that the design could not increase the thickness of the granular materials instead of substituting less permeable soils, as long as the k standard is met or exceeded. However, from the alternative design proposed, it is clear the PRPs do not want to take this direction.*

**Group Response:** The strip drains proposed for the landfill cover system were one inch thick and 12 inches wide. The inconsistency with the text description in the Preliminary Design was communicated to EPA in our February 14, 1997 letter and also via fax transmission to

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EARTHTECH on February 12, 1997. Per our response to EPA Comment 12, the HELP model will be rerun with the revised cover system section.

WCC will not compromise the performance of a design for cost savings. However, it is our duty to control costs where possible when performance standards can be met with an alternative material or approach.

**EPA Comment 17:** *3.3.3 Passive Gas Venting System: In general, I don't understand why the PRPs think we should consider lowering the standard for the gas collection layer from sand to a less permeable soil.*

**Group Response:** As stated in the response to EPA Comment 11, the gas collection layer as proposed is in compliance with the ROD, SOW and Michigan Rule 425. No standard has been lowered.

**EPA Comment 18:** *Page 3-5, Section 3.4 Drum Removal: Please expand on the drum staging area. The staging area should be a storage pad lined with PVC or PE and bermed to contain potential spills/leaks.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 19:** *Page 3-5: Section 3.3.4, second bullet -  $5.2 \times 10^{-4}$  cm/sec material in conjunction with strip drains is not technically equivalent to  $1.0 \times 10^{-2}$  cm/sec material.*

**Group Response:** The design will be modified as described in our response to EPA Comment 12.

**EPA Comment 20:** *Page 3-5: Section 3.3.4, third bullet -  $5.2 \times 10^{-4}$  cm/sec material does not qualify as a "permeable soil layer" as required in Rule 425 of Michigan's Act 641. Good engineering practice dictates the use of a material with a minimum permeability of  $1.0 \times 10^{-3}$  cm/sec.*

**Group Response:** See response to EPA Comment 11. The comment also does not take into account that a series of gas collection trenches, below the sand gas collection layer, at 200 foot spacing were designed to control gas migration.

**EPA Comment 21:** *Page 3-5: Section 3.4 - Make this section consistent with page 23 of the ROD and page 2-2 of the RD. Specifically, "drums containing liquids and/or hazardous materials" require off-site disposal or treatment. The RD does not specify how the USTs located on the east side of the site will be dealt with. Please do so.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 22:** *Page 3-5: Section 3.5 - Change the third bullet in this section to read "Remove all waste and visibly stained soils."*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 23:** *Page 3-5: Section 3.5 - The statement in the sixth bullet of this section makes a statement about an action level at the perimeter of the exclusion zone. The HASP must distinguish between perimeter action levels and breathing zone action levels. Also, these action levels must be established based on the acceptable action levels of the constituents identified at the site.*

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**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 24:** *Page 3-6: Section 3.6 - Add a fourth bullet stating the following: "Comply with applicable air quality standards."*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 25:** *Page 3-6: Section 3.7 - USEPA does not agree that the cover system proposed in the 30% Design is equivalent to the cover system required in the ROD. Please see General Comment.*

**Group Response:** The cover section will be redesigned as described in our response to the EPA General Comment and Comment 12.

**EPA Comment 26:** *Page 3-6: Section 3.7, third bullet - Will compaction requirements be increased for areas directly beneath of the service road?*

**Group Response:** The gas collection/foundation layer will be compacted to 90% of standard density and smooth rolled for FML placement. The layers above the FML will not be compacted to avoid damage to the FML. Road base material will be smooth drum compacted for the service road and will be designed to resist wear by traffic.

**EPA Comment 27:** *Page 3-6: Section 3.7, Drainage Layer - Act 641 does not require 24 inches of drainage layer. Also, the statement in the second bullet is not believed to be true.*

**Group Response:** A reference is made in Section 3.7 to 24 inches of cover soil, not drainage layer. The section will be rewritten to incorporate the geonet drain layer substitution for on-site soils with strip drains.

**EPA Comment 28:** *Page 4-1: Section 4.2, paragraph 2 - Change the sentence that starts out "Any large trees..." to "Trees and shrubs..." The term large is too subjective. Also, all wooded vegetation should be chipped to ensure that unacceptable voids are not created. The RD does not specify how the USTs located on the east side of the site will be dealt with. Please do so.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 29:** *Page 4-1, Section 4.2 Waste Movement and Site Grading: Please include language to address metal debris to be scrapped off prior to initiating grading activities.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 30:** *Page 4-3: Section 4.4.1 - Change title to "Gas Venting/Foundation Layer." Silty sand is not acceptable for this layer. Also, will compaction requirements be increased for areas directly beneath of the service road?*

**Group Response:** See response to EPA Comment 11 for gas venting layer issues. See response to EPA Comment 26 for compaction requirements issues.

**EPA Comment 31:** *Page 4-3: Section 4.4.2 - It is the PRP's responsibility to ensure that the materials used for construction of the cap are suitable for ensuring slope stability during and after construction including saturated conditions prior to establishment the vegetative cover.*

**Group Response:** The design has and will continue to responsibly address slope stability.



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**EPA Comment 32:** *Page 4-3: Section 4.4.3 - The cover soil is to be placed above the drainage layer, not the FML.*

**Group Response:** This paragraph was accurate as stated in the Preliminary Design when on-site soils were proposed for the drainage layer. This paragraph will now be revised to incorporate the geonet drainage layer overlying the FML.

**EPA Comment 33:** *Page 4-4: Section 4.4 - The topsoil/vegetative layer should be dissimilar enough from the cover soil so as to discourage root growth into the underlying cover soil layer.*

**Group Response:** The topsoil will have organic material and nutrients necessary to establish vegetative growth. It is acceptable for roots to become established in the underlying cover soils; this increases the longevity of the cover system.

**EPA Comment 34:** *Page 4-5: Section 4.5.2 - Does this comply with the manufacturer's minimum recommendations?*

**Group Response:** The factor of safety used in this analysis exceeds that recommended by the GSE Technical Representative that provided information for the FML.

**EPA Comment 35:** *Page 4-6: Section 4.5.4 - Analysis of the storm water runoff analysis must be part of the RD before the Final RD can be approved.*

**Group Response:** As stated in Section 4.5.4, it was premature to complete the stormwater runoff analysis during the Preliminary Design because the grading plan and final stormwater retention facilities had not been finalized due to adjacent property issues. The stormwater runoff analysis will be provided in the 95% submittal.

**EPA Comment 36:** *Section 4.5.5, and Appendix A, HELP Model - One of the critical outputs from the HELP model is the average annual head over the barrier layer. There is a strong correlation between average annual head and the amount of water that percolates through the barrier layer. The 2/14 HELP model shows an average head of about 12 inches. This is pretty high. A good drainage system should not allow the maximum head (peak daily head) to exceed 2 inches, and the average head to exceed 1 inch. This can be easily accomplished with a full-area geonet, or a gravel layer 12 inches thick or greater. The synthetic cap profile at one of my sites results in about 0.35 inches of average head.*

*In paragraph 3, the PRPs point out that the HELP model results show no percolation/leakage through the FML, and minimal head build-up even after a peak daily storm event. They use the output from the model to calculate inflow rates for purposes of spacing their strip drains. Just a comment on the two HELP model runs provided in Appendix A. Both model runs show less than one inch of water buildup over the FML both for average annual and peak daily heads, and zero infiltration through the FML. When zero infiltration occurs, either your drainage layer is of excellent design (not the case here) or something is wrong with the model input. In this case, values for slope and drainage length were input as zero. The model reads this as if all the water is almost immediately drained out once it hits the drainage layer. Slope length of zero will nearly always result in zero infiltration across the barrier layer. This input error, which lead to erroneous conclusions in sections 3 and 4, was not carried forward to the model results provided in the 2/14 letter. The peak daily head with the drains increase from 16 to 20 inches, yet, the consultant draws the same conclusions in that letter as are reached here.*

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*The PRPs should provide HELP model runs that include 1) a granular drainage layer based on the minimum k performance standard and 2) a drainage layer composed of the maximum allowable grain size of 3/8 inches (this grain size corresponds to pea gravel. With pea gravel you can expect a k of about  $3 \times 10^{-1}$  cm/sec or better, which would substantially reduce the average head and bring annual average percolation through the barrier layer to less than 1/10 inch.). The PRPs have made comparability claims for their alternative without providing these model runs for comparison.*

**Group Response:** The HELP model input error in the Appendix A of the Preliminary Design was corrected in our letter of February 14, 1997 and communicated to the EPA oversight consultant several days prior to the letter. The HELP model will be rerun using the revised final cover section referred to in our response to EPA Comment 12.

**EPA Comment 37:** *Page 5-2: Add Specification Section 01300 - Submittals.*

**Group Response:** Section 01300 will be added in the 95% Submittal.

**EPA Comment 38:** *Page 6-1, Section 6.1 Introduction: The deed restrictions should prohibit the installation of groundwater wells and use of groundwater from the area noted in Figure 4 of the ROD.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 39:** *Page 6-2: Section 6.4 - Is an air discharge permit required or a substantive requirements document form the State? How will PRPs ensure compliance with substantive discharge requirements?*

**Group Response:** The design will comply with the terms of the Unilateral Administrative Order and will address MDEQ air requirements.

**EPA Comment 40:** *Page 6-2, Section 6.4 Permit Requirements: The liable parties will need to petition the MDEQ's Surface Water Quality Division for a mixing zone determination to determine if contaminated groundwater is venting to the Kalamazoo River.*

**Group Response:** Surface water sampling was completed as part of the RI (p. 4-31). Organic compounds were not detected in the river or the adjoining wetlands above background levels. Inorganic compounds were only sporadically detected above background. A loading model was performed as part of the RI using adjacent monitoring well water quality results. The model determined that groundwater loading to the river would not result in surface water concentrations above Act 245, Rule 57 Guidelines and Federal Water Quality Criteria. Therefore a petition should not be necessary.

**EPA Comment 41:** *Implementation Schedule - Need to assume that the Gas Vent/Foundation layer will need to be protected to avoid potential erosion from rain and snow melt.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 42:** *Page 11-1: Section 11.1 - Act 641 requires a minimum of quarterly monitoring for methane. All references to "periodic" inspections or monitoring should be changed to "routine." The O&M should include provisions to address settlement of the cover as well as erosion.*

**Group Response:** Gas vents will be monitored routinely for methane on a quarterly basis. Inspections of the landfill will be conducted on a routine, as opposed to periodic basis.

**EPA Comment 43:** *Page 11-1, Section 11.2 Groundwater Monitoring System Operation and Maintenance: Additional investigative work is needed to complete the basic hydrogeologic study for a landfill site as required in the Solid Waste Management rules of Act 451. Additional information needed to support the groundwater monitoring proposed in the 30% design report needs to include: 1) background water quality on the east and possibly west sides of the landfill; 2) the defined aquifer thickness; 3) the defined deep bedrock groundwater quality and bedrock elevations across the site and; 4) a map that shows the distance to all existing wells and the properties in the surrounding area that have potential for groundwater supplies. The map needs to identify all soil borings and wells with ½ mile of the site, including all domestic, municipal, industrial, oil and gas wells for which copies of logs are available. This area includes wells south of the Kalamazoo River; 5) include or reference the location of observation well records or soil borings; 6) provide a groundwater elevation map using elevations referenced to United States geological survey datum.*

*This data should include possible variations in groundwater flow direction; 7) provide or reference geologic cross-section or fence diagrams; 8) provide a list of all stabilized static water level readings; 9) a monitoring plan for the surface water to that may receive leachate by groundwater venting; 10) all wells must be clearly labeled and shall be properly vented, capped, and locked when not in use. In addition, all wells shall be visible throughout the year. Protective posts painted in bright colors will help comply with this request; and 11) the construction of monitoring wells will be completed by a well driller registered under or regulated by Act 451.*

**Group Response:** Extensive hydrogeologic data was collected during the RI and Pre-Design phases of this project; these data provide adequate site and vicinity hydrogeologic characterization. To date, 33 monitoring wells have been installed at the site in the overburden, shallow and deep bedrock. Selected deep monitoring wells were subjected to downhole geophysical surveys. Groundwater quality data has been collected from the on-site monitoring wells as well as 10 residential wells and analyzed for SAS Low Level Organics, Low Level Metals (filtered and unfiltered), and general water quality parameters. Surface water (23) samples were analyzed for SAS Low Level Organics, Low Level Metals (filtered and unfiltered), and general water quality parameters. Sediment (23) and soil (17) samples were collected and analyzed for TCL organics and TAL inorganics. Based upon all of the collected data, a detailed groundwater monitoring program was defined by EPA in the ROD and SOW and the design was completed based on this information.

**EPA Comment 44:** *Page 11-2: Section 11.3 - As per previous comment, gas monitoring is required. The modeling performed as part of the PreDesign was to determine whether or not an active or passive gas system was necessary. It was not a substitute for air monitoring during remedial action or O&M. Furthermore, the modeling was performed on a vertical well gas network not the proposed horizontal well network. As such, the 30% Design is deficient because it does not include an air monitoring program as required by the ROD.*

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**Group Response:** Methane monitoring will be completed at the gas vents as described in the response to EPA Comment 42. Modeling was performed during the Pre-Design phase of this project to document whether an active or passive gas extraction system would be required. The emission rates of methane and non-methane organic compounds was calculated using the EPA Landfill Air Emissions Estimation Model. This model estimates the total emissions from the landfill and does not require any input as to what type of gas collection system will be constructed. The estimated emissions were then modeled under two scenarios: 1) emissions anticipated during the waste consolidation efforts; and 2) emissions once the vent system and cap are constructed. The vent system scenarios assumes that all of the emissions are released at one point source, as opposed to discrete vent locations. The modeling results are the same whether a horizontal or vertical network is assumed. The 95% submittal will be revised to include air monitoring consistent with the ROD.

**EPA Comment 45:** *Drawing 3: Identify location of Sections A, B, C, D, and E shown on Drawing 4. Grading in some areas, especially to the north, of the FML appear to be greater than 25 percent.*

**Group Response:** Sections A through E will be located on Drawing 4 in the 95% submittal. The grading plan does not and will not have any area over waste where slopes exceed 25%.

**EPA Comment 46:** *Drawing 4: We do not agree that Sections C, D, or E portray a cover system that is in compliance with the ROD.*

**Group Response:** These sections will be revised to reflect the cover system modifications discussed in previous responses.

**EPA Comment 47:** *Drawing 5: Is the note on the drawing that states "Manhole See Detail" referring to the "Catch Basin" shown on Drawing 6.*

**Group Response:** The reference to "Manhole See Detail" on Drawing 5 should refer to the catch basin on Drawing 6.

**EPA Comment 48:** *In the February 4, 1997 conference call, we raised the issue of the location of the infiltration basin. WWC provided a response in their February 14, 1997 letter to U.S. EPA. U.S. EPA has reviewed the response and does not believe that it addressed our original concern. How will this infiltration basin impact water levels within the fill? We believe that water infiltrating through the basin will intersect the groundwater table and will flow with groundwater through the fill itself. During a storm event used in the "Response to Technical Issue 5", the amount of water could cause a rise in the water table elevation. With time, the infiltration pond will likely start to silt up. This would cause standing water to collect in the pond. Standing water would cause mounding to occur which would result in the water table to rise up into the fill more than shown on the cross-section.*

**Group Response:** The Group is currently in the process of securing access to the adjacent property for the purpose of stormwater management. The intention in gaining access to the adjacent property is to move the stormwater infiltration basin as far from the fill as is feasible to minimize the potential for groundwater mounding impacts. The relocated infiltration pond will be documented in the 95% submittal.

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**EPA Comment 49:** *Drawing 6: We do not agree that Sections A, B, and C portray a cover system that is in compliance with the ROD. Section A refers to "foundation layer", not a gas collection/foundation layer. Was this intentional?*

**Group Response:** Sections A and B of Drawing 6 will be revised to reflect the cover system modifications discussed in previous responses. Drawing 6 does not have a Section C. Reference to the foundation layer in Section A instead of foundation/gas collection layer was a typographical error; it was not intentional.

**EPA Comment 50:** *Drawing 7: This drawing does not portray a 200 foot spacing for the horizontal vent well system as described in the text. In addition, U.S. EPA recommends a N-S interconnected horizontal vent pipe at the crown of the cover system. This may affect the placement of the road. Detail 1 on Drawing 7 does not match Detail 1 on Drawing 8.*

**Group Response:** A north-south gas collection trench connecting east-west trenches is not required based on our design calculations. Vent risers will be installed at 200 foot intervals along the horizontal trench alignment.

**EPA Comment 51:** *Drawing 8: Detail 2 should show slots into the Gas Collection layer to collect the accumulated gas.*

**Group Response:** The gas collection layer will be tied into the gas collection vent slots.

**EPA Comment 52:** *Drawing 9: The chain link fence must include three strands of barbed wire per the SOW.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

### APPENDIX B FINAL REPORT PERFORMANCE MONITORING PLAN

**EPA Comment 53:** *Page 1-1, Section 1.1 Site Location and Description: The Amberton Village housing development is located on the east side of the site with residences about 500 feet away from the landfill. Drawing 2 identifies a number of lotted properties located immediately adjacent to the landfill. It does not appear that these lots have existing residences. Although there will be restrictive covenants preventing water supply wells downgradient from the landfill, will there be any isolation distances required? Lateral isolation distances for landfill are required under the Michigan Solid Waste Rules.*

**Group Response:** The Group does not own the property east of the landfill. The isolation distance criteria is for permitting new landfills and does not appear to be applicable. The need for other types of use controls should be assessed by MDEQ and EPA.

**EPA Comment 54:** *Page 2-1, Section 2.1 Site Geology: Please reference and/or include the location of the geologic cross-section or fence diagrams.*

**Group Response:** A geologic cross section will be adapted from the Remedial Investigation and included in this section.

**EPA Comment 55:** *Page 2-1, Section 2.2 Hydrogeology: There needs to be adequate definition of groundwater flow direction before determining a groundwater monitoring plan. The monitoring system will be based on locations designed to assess the impact of the discharge on*

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groundwater. The state solid waste programs generally require groundwater monitoring wells at least every 150 to 300 feet for monitoring purposes at landfill that have a base liner, sidewalls, and perimeter collection systems. The Albion-Sheridan Township Landfill, without a liner or sidewalls, and only a cap proposed for its remediation, has spaces of over 1000 feet between wells for groundwater flow direction determination and monitoring. Listed below are our suggestions on how to correct this issue.

On the **northwest side**, there is approximately 1,050 feet between MW01 and MW03. The groundwater flow direction maps show different curvatures on the contour lines from 1992, 1993, and 1996. These discrepancies confuse whether the contour lines flatten out, extend more to the north or curve back to the south. By installing wells in this vicinity, it will help determine if any contamination may be migrating from any areas upgradient of the site. If the adjacent landowner will not permit well installation, one important location that should be addressed would be just within lot 27 parcel 4 about 400 feet north of MW03. The nested wells should be screened in the unconsolidated glacial, weathered bedrock and shallow bedrock aquifers. This location will be good for obtaining additional groundwater quality information to support the contaminant plume profiles provided in June 1993. It would also be helpful to know for monitoring purposes if all contaminant plumes end just north of MW03 as shown on the diagrams or just short of MW01, 1000 feet north of MW03. If the groundwater flow direction is more westerly in this area then it needs to be adequately monitored.

On the **west side**, it would be helpful to include a well cluster between MW03 and MW04 for downgradient monitoring. There is more than 450 feet between MW03 and MW04.

On the **south side**, arsenic has been detected in MW16SB at 7.9 ug/l. There are no wells at the appropriate depth downgradient from MW16SB to monitor the arsenic plume. Adding wells screened in the weathered bedrock and shallow bedrock would be useful to monitor the downgradient plume at MW12SG and MW13SG. The MDEQ would also like to see additional wells screened in the weathered and shallow bedrock at MW10SG.

On the **southeast side**, please include two additional well clusters between MW05 and MW07. These wells could be an important downgradient location for all aquifers that have been overlooked.

On the **east side**, given the lack of data along nearly the entire side, groundwater quality for homes immediately adjacent to the landfill can not be assured. There is no protection for residences such as a 300 feet isolation distance. Currently MW02 and MW05 are spaced approximately 300 feet apart. Any wells placed on the perimeter between MW02 and MW05 would be an improvement.

**The river.** The liable parties charge that groundwater is discharging to the Kalamazoo River based on an upward gradient at a well nearly 700 feet north of the river. Groundwater contaminant data does not appear to support this theory. Additional information such as groundwater flow direction on the other side of the river, vertical gradient determination on the opposite side of the river, and tracer test information to support the liable parties claims is needed. The contaminant concentration profiles dated June 1993 do not support plume discharge to the river. Groundwater samples results from MW16SB show 7.9 ug/l arsenic at a depth similar to the previously mapped plume depth. The plume is not getting shallower to allow

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venting to the river. There is no monitoring planned south of the river and there are no wells south of MW16 that are screened a plume depth (weathered or shallow bedrock aquifers). If groundwater is venting to the river, it will be necessary to include a discharge permit within the permit requirements section. At a minimum, it will be necessary to collect upgradient and downgradient surface water samples.

**Group Response:** As discussed in the response to EPA Comment 43, significant site characterization has been completed at this site during the Remedial Investigation and Pre-Design phases of this project. The specific groundwater monitoring plan EPA and MDEQ agreed to in the ROD and SOW was based on this extensive amount of information. As discussed in our conference call of March 13, 1997, two additional monitoring wells are required to be installed as part of the pre-design activities defined in the SOW. These wells have not yet been installed because of problems with obtaining off-site access. The Group is amenable to EPA proposing alternate locations for these two wells to address the issues raised in this comment. The Group does not believe that any additional site characterization, beyond that defined in the SOW, is required.

**EPA Comment 56:** *Page 4-1: Section 4.1 Excavation. This section does not address removal or closure of the USTs. Please do so.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 57:** *Page 4-1: Section 4.2 Drum Removal and Characterization, Paragraph 2 References using an AZCAT test. The text should spell out what the acronym means. It may be helpful to illustrate a flow chart or other diagram showing the initial characterization regime, how the waste will be segregated and how the waste will end up in each of the final disposal options.*

**Group Response:** HAZCAT is an acronym for Hazardous Categories Testing. The draft drum removal and treatment plan will be finalized by the contractor. A process flow diagram defining the characterization process will be included in the final plan.

**EPA Comment 58:** *Page 4-1: Section 4.3 Temporary Storage and Transportation. Section 4.3 should be more specific in where the drums will be stored on the surface of the landfill.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 59:** *Page 4-2, Section 4.4 Monitoring Requirements. As stated previously, air monitoring during remedial action is required by the ROD.*

**Group Response:** Section 4.4 will be revised to require fenceline monitoring of VOCs of concern during intrusive phases of the remedial action.

**EPA Comment 60:** *Page 4-2, Proposed Section 4.7. A reporting section should be added here to report or summarize the drum removal activities.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 61:** *Page 5-1, Section 5 Landfill Cap Construction Monitoring Plan: The performance monitoring plan includes monitoring the construction of the landfill cap but not long-term performance monitoring of the landfill cap. Please expand this section to include long-term performance monitoring of the landfill cap.*

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**Group Response:** The Performance Monitoring Plan is required to include construction of the landfill cap. The Operation and Maintenance (O&M) Plan will cover the monitoring of the cap performance during the post-closure period. A draft O&M Plan will be submitted as part of the final design as required by the SOW.

**EPA Comment 62:** *Page 6-1, Section 6.0 Landfill Gas Collection System Monitoring Plan. As stated previously, a remedial action and O&M landfill gas monitoring program is required.*

**Group Response:** These monitoring programs will be added as described in the previous comments regarding this issue.

**EPA Comment 63:** *Page 6-1: It will be necessary to field verify the landfill air emissions estimation model calculations and prepare a long-term operations and maintenance plan if necessary.*

**Group Response:** Landfill gas monitoring and contingency O&M comments will be addressed in the O&M Plan.

**EPA Comment 64:** *Page 7-1, Section 7.1 O&M Monitoring Well Locations. Please provide a figure showing exactly which wells will be sampled in the quarterly and annual groundwater monitoring program.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

**EPA Comment 65:** *Page 7-1, Section 7.1 O&M Monitoring Well Locations: The locations of monitoring wells should be revised or expanded once further hydrogeologic definition is provided, see comment no.15. Existing monitoring wells for shallow glacial groundwater should include MW06SG (to monitor the existing arsenic plume), MW12SG and MW13SG (to monitor for arsenic in downgradient wells). Weathered bedrock wells need to be included in the monitoring plan. This highest concentration of arsenic is in MW06WB. This well is exactly downgradient and screened in the best location to show downgradient groundwater quality. The monitoring wells selected for weathered bedrock should be identical to the shallow bedrock wells.*

**Group Response:** See responses to EPA Comments 43 and 55.

**EPA Comment 66:** *Page 7-1, Section 7.2 Monitoring Well Installation: Please clarify if schedule 40 or 80 PVC riser and well screen will be used.*

**Group Response:** Schedule 80 PVC riser and well screen materials will be used.

**EPA Comment 67:** *Page 7-2, Section 7.4 O&M Groundwater Analysis Program: Based on existing information, the monitoring plan should be modified to include additional parameters appropriate for a landfill that has accepted industrial and municipal waste.*

**Group Response:** The sampling parameters defined in the SOW (p. 4 and 5) were based on the evaluation of extensive groundwater data collected during the RI. The EPA believed that the parameters included were appropriate indicator parameters. No new information has been collected to warrant changes to the indicator list.

**EPA Comment 68:** *Quarterly groundwater monitoring needs to include chlorides, iron, sulfates, total inorganic nitrogen, total dissolved solids, magnesium, manganese, potassium,*



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*sodium, as well as, field parameters, arsenic and ammonia. In addition, the groundwater depth and elevation before purging will need to be collected for all site wells.*

**Group Response:** See response to EPA Comment 67. Groundwater depth and elevations will be collected prior to purging each well as described in SOP-06 (Water Level Measurements).

***EPA Comment 69:** The quarterly monitoring of the seven drinking water wells will need to consist of: 1) all parameters listed above; 2) parameters listed in Part 115, P.A. 451 as follows: heavy metals as listed in R229.4452 including aluminum; primary volatile organic constituents (VOCs) listed in R299.4452 (halogenated and aromatic VOC's); secondary organic parameters as listed in R299.4454 (carbon disulfide and 1,2-Dibromo-3-chloropropane); cyanide, mercury, antimony, and the parameters included in the groundwater monitoring plan.*

**Group Response:** See response to EPA Comment 67.

***EPA Comment 70:** Annual monitoring will need to consist of the parameters listed for the quarterly monitoring of the seven drinking water wells.*

**Group Response:** See response to EPA Comment 67.

***EPA Comment 71:** Page 7-2, Section 7.4.2 Annual Groundwater Monitoring: Please include iron and bis(2-Ethylhexyl)phthalate as chemicals of concern to be monitored for.*

**Group Response:** See response to EPA Comment 67.

***EPA Comment 72:** Page 7-2, Section 7.4.3 Five-Year Review Groundwater Monitoring: Post-closure care included in monitoring of a Type II (lined) landfill in Michigan under the part 115 rules of Act 451 (previously Act 641) continues for not less than 30 years. Groundwater monitoring proposed for the Albion-Sheridan Township Landfill will cease after five years if arsenic is at an acceptable level. Consideration should be given to extending this requirement.*

**Group Response:** This section does not indicate that groundwater monitoring will end at the conclusion of the five year monitoring review period. Groundwater monitoring will continue.

***EPA Comment 73:** Section 7.3 O&M Groundwater Sampling Program. References to Act 641 and Act 64 should be revised to the appropriate parts under NREPA, Act 451.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

***EPA Comment 74:** Please reference figure requested in previous comment.*

**Group Response:** This comment will be incorporated if it refers to the groundwater monitoring well location plan requested in EPA Comment 64.

***EPA Comment 75:** Please provide a schedule for quarterly and annual groundwater monitoring.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

***EPA Comment 76:** Please provide a table which summarizes which wells are analyzed for what parameters on what schedule.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

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*EPA Comment 77: Please provide a table summarizing the parameters to be analyzed, methods and detection limits.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

*EPA Comment 78: Page 7-2, Section 7.4.3 Five-Year Review Groundwater Monitoring. What will the comparison criteria be? Michigan Public Act 307 which was in effect at the time the ROD was signed? Natural Resources and Environmental Protection Act 451, Part 201 which is in effect now? Applicable criteria at the Five-Year mark? Residential versus industrial?*

**Group Response:** Both Act 307 and Act 451 were in effect when the ROD was signed. Generic residential criteria apply. The criteria to be used for comparison are described in the ROD.

*EPA Comment 79: Page 8-1, Section 8.2 Analytical Methods: Please include the use of Operational Memorandum #6, Revision #4 dated September 13, 1995.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

*EPA Comment 80: Page 8-1, Section 8.3 QA/QC. Will the O&M QAPP be provided in the next submittal?*

**Group Response:** The O&M QAPP will be submitted with the final O&M Plan at the conclusion of the remedial action.

*EPA Comment 81: Page 8-1, Section 8.5 Requirements for Health and Safety Protocols. Should references to Act 641 and Act 64 be revised to the appropriate parts under NREPA, Act 451?*

**Group Response:** This comment will be incorporated in the 95% Submittal.

*EPA Comment 82: Page 9-1 Reporting. This section needs to be more explicit. At a minimum, analytical results should be summarized in tabular format cumulatively. IE. the tables should include all quarterly data (current and historic) for purposes of comparison. Exceedances of applicable criteria should be highlighted.*

*For the compounds of concern, it would be useful to plot concentrations vs. time for specific wells. This would be useful in determining if the concentrations are increasing with time and if this is a concern.*

**Group Response:** This comment will be considered in the 95% Submittal.

*EPA Comment 83: Isoconcentration maps for arsenic would be beneficial.*

**Group Response:** This comment will be considered in the 95% Submittal.

*EPA Comment 84: Groundwater contour maps for each aquifer/each quarter would be most beneficial.*

**Group Response:** This comment will be considered in the 95% Submittal.

*EPA Comment 85: A schedule for reporting the results to the U.S. EPA and MDEQ should be provided or described.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

*EPA Comment 86: Please detail what information will be provided in the report.*

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**Group Response:** This comment will be incorporated in the 95% Submittal.

*EPA Comment 87: Page 10-1, Schedule. Page 4 of the Statement of Work requires quarterly monitoring for five years. The language in this section implies that there is "wiggle room" to modify the sampling schedule after the first year. This is not the case. Furthermore, the parameters to be analyzed quarterly and annually is spelled out in detail in the SOW.*

**Group Response:** The EPA responsiveness summary allows for modifications in the future; this is meant to include new and exclude old parameters, if appropriate. Section 10 indicates that the sampling and analysis program may be modified in the future. Any modifications to the groundwater sampling and analysis would be completed in full compliance with the SOW.

*EPA Comment 88: SOP-08. Section 5.0 Handling of Decontamination Fluids. USEPA does not recommend placing equipment decontamination fluids upgradient of the landfill. This water will have the potential to be transported with groundwater through the refuse.*

**Group Response:** This comment will be incorporated in the 95% Submittal.

### **Letter of February 14**

*EPA Comment 89: Page 2, Paragraph 1 - The ROD set a minimum standard for  $k$  of  $1 \times 10^{-2}$  cm/sec. It is not up to us to lower that standard short of issuing an ESD, whether or not the State would accept it. In truth, a sand layer of  $1 \times 10^{-3}$  cm/sec will not perform much better than the soil they are proposing. It just isn't permeable enough, and 6 inches is not thick enough.*

**Group Response:** We do not agree with this comment regarding the drainage layer. However, the Group agrees to modify the cover section design as described in our response to EPA Comment 12.

*EPA Comment 90: Page 2, Paragraph 3 - This paragraph makes no sense, and the claim of a 2 inch "maximum average saturated soil depth" (I assume that means head) over the FML cannot be substantiated from the attached model run. When dealing with soils with a  $k$  of  $5 \times 10^{-4}$  cm/sec, the key output affecting infiltration through the FML is the average annual head over the FML, which according to the attached HELP model is high at 12.5 inches. Also, in the text of the letter and the design document the on-site soils are represented as having a  $k$  of  $1 \times 10^{-4}$  cm/sec, whereas the HELP model assumes a  $k$  of  $5 \times 10^{-4}$  cm/sec. This difference will also contribute to a lower output for percolation through the barrier layer and make the proposed design alternative look better than it might otherwise be. Conversely, if the on-site soils actually do have a  $k$  closer to  $1 \times 10^{-4}$  cm/sec, the average annual head will increase, leading to increased percolation.*

*A related comment is that QC for the on-site soils during construction will probably be minimal. Unless the degree of homogeneity of these soils has previously been determined, the resulting cap may contain areas where the  $k$  is lower than the design  $k$ . This would result in sub-areas of the cap that support a higher average annual head than that already indicated in the model., (with or without the strip drains).*

**Group Response:** See response to EPA Comment 12.

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**EPA Comment 91:** Page 3, Paragraph 1 - WCC has judged that the strip drain approach is applicable because it is similar to how leachate drains are developed for landfill bottom liners. The model used by WCC assumes parallel channels for leachate collection use. In a real situation, however, the drain strips in a leachate collection system will converge at the center from a high point at the outside edge of the landfill. Therefore, when water (or leachate) flows downhill toward the center of the "bowl", it will naturally encounter a drain and be moved efficiently to a collection area. If the strip drains are installed for cover drainage as depicted in Figure 6 of the 30% design, there is no convergence of the drain strips. A substantial amount of water in the soil will not be collected by the drains, resulting in higher average annual head over the FML than would be that case if an efficient drainage layer were installed over the entire area.

In the last sentence WCC compares the peak daily saturated thickness (with drains) to that of a six inch drainage layer with a  $k$  of  $1 \times 10^{-3}$  cm/sec. This comparison is not valid because that  $k$  value does not meet the minimum performance standard for  $k$  in the ROD (see comment in re: page 2, paragraph 1 above). WCC needs to compare their proposal with a compliant alternative.

WCC has not factored in a reduction in strip drain efficiency due to clogging over time of the geotextile that wraps the strip drains. Such clogging does happen, and will happen more readily where large volumes of water carrying soil and silt particles pass through a relatively small surface area. For the strip drains there is approximately a one-foot square surface area through which water from 20 square feet of drainage area needs to pass, as compared to a 1:1 ratio of drainage area to geotextile area for a full-coverage drainage layer.

**Group Response:** See response to EPA Comment 12.

**EPA Comment 92:** HELP Model Attachment - The input assumptions for the FML are fairly optimistic. The U.S. Army Corps of Engineers (USACE), which developed the model, usually assume 5 to 7 defects per acre. In the HELP manual the range for installation defects per acre is from 0 to 1 for excellent placement, 1 to 4 for good placement, 4 to 10 for fair placement. WCC has optimistically assumed the high end of good placement, which results in a fairly low infiltration rate even with the 12.5 inch annual head over the FML. Infiltration will increase with increasing defects.

In summary, the design analysis used to support the proposed alternative cap profile appears to have been based on optimistic input assumptions to all areas that would support the analysis, and on less than allowed minimums for areas from which the PRPs want to change. The result still does not look as good as an alternative that uses a full-area drainage layer. An efficient, full-area layer will eliminate any concerns about slope stability, even with the relatively high slopes at this site, and will virtually eliminate percolation through the barrier layer. Costs for a 12-inch gravel drainage layer will vary locally. A geonet will cost approximately \$7900 per acre, installed, non-union labor. The full synthetic profile (FML, Geonet, Geotextile) will cost about \$26,500 per acre. If the remaining soils are available on-site as represented, assume \$1.50/cubic yard for excavation and placement. Twenty-four inches of select fill and 6 inches of topsoil would cost about \$4840 per acre.

**Group Response:** The HELP model input assumptions for the FML will be as recommended by

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the U.S. Army Corps of Engineers in the EPA Comment letter.

We believe that the cost estimate provide in this comment are unrealistically low. Costs for the full synthetic cover system profile provided below were generated with input from contractors, manufacturers and WCC's past project experience. The full synthetic profile is listed below with the estimated cost per acre for the various cover components:

- 6" Imported Topsoil                      \$15,240/acre
- 24" Cover Soil                              \$15,240/acre
- 40 mil FML                                  \$19,600/acre
- Geonet                                        \$21,780/acre

The total cost per acre is estimated at \$71,860. For the same cover section, EPA has estimated a per acre cost of \$31,340.